

DTIC FILE COPY

4

Center
for
Leadership
Studies

AD-A211 969

TRANSFORMATIONAL LEADERSHIP
AND PERFORMANCE:
A STRUCTURAL EQUATIONS APPROACH

ONR-TR-8

Francis J. Yammarino
William D. Spangler
Bernard M. Bass

DTIC
ELECTE
AUG 3 1 1989
S D CB D

Report Series



Binghamton
STATE UNIVERSITY OF NEW YORK

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

89 8 30 031

4

TRANSFORMATIONAL LEADERSHIP
AND PERFORMANCE:
A STRUCTURAL EQUATIONS APPROACH

ONR-TR-8

Francis J. Yammarino
William D. Spangler
Bernard M. Bass

RECEIVED
SEP 11 1989
CY

DISSEMINATION STATE - T A
Approved for public release
Distribution Unlimited

September 1, 1989

REPORT DOCUMENTATION PAGE				Form Approved OMB No 0704-0188	
1a REPORT SECURITY CLASSIFICATION Unclassified			1b RESTRICTIVE MARKINGS N. A.		
2a SECURITY CLASSIFICATION AUTHORITY N. A.			3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited/		
2b DECLASSIFICATION / DOWNGRADING SCHEDULE N. A.					
4 PERFORMING ORGANIZATION REPORT NUMBER(S) ONR-TR-8			5. MONITORING ORGANIZATION REPORT NUMBER(S) Same		
6a NAME OF PERFORMING ORGANIZATION Center for Leadership Studies State University of New York		6b OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION Office of Naval Research		
6c. ADDRESS (City, State, and ZIP Code) Binghamton, NY 13901		7b ADDRESS (City, State, and ZIP Code) 800 N. Quincy Street Arlington, VA 22217-5000			
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Office of Naval Technology		8b OFFICE SYMBOL (If applicable) Code 222	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N00014-87-K-0434		
8c. ADDRESS (City, State, and ZIP Code) 800 N. Quincy Street Arlington, VA 22217-5000		10 SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT NO 62233N	PROJECT NO RMS33M20	TASK NO	WORK UNIT ACCESSION NO
11. TITLE (Include Security Classification) (U) Transformational leadership and performance: A structural equations approach					
12. PERSONAL AUTHOR(S) Yammarino, F. J., Spangler, W. D., & Bass, B. M.					
13a. TYPE OF REPORT Technical		13b TIME COVERED FROM 87/04/01 TO 89/08/31		14. DATE OF REPORT (Year, Month, Day) 9/1/89	
15 PAGE COUNT 41					
16 SUPPLEMENTARY NOTATION Supported by the Office of the Chief of Naval Research Manpower, Personnel, and Training R&D Program					
17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Transformational leadership; Transactional leadership; Subjective performance; Objective performance; (continued on back)		
19 ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>A model of leadership and performance was developed and tested with a sample of United States Navy Officers. A representative sample of a total of one hundred eighty-six graduates of the United States Naval Academy (USNA) who had been assigned to the surface warfleet participated in the study. Data concerning these officers were collected from USNA records, 793 senior subordinates of the officers, and the officers' superiors since time of commission. LISREL procedures were used to test the basic model and results provided support for the proposed conceptual model. Specifically, military performance while at the USNA predicted subsequent officer leadership and objective performance while in the fleet. Transformational leadership and laissez-faire officer leadership while on fleet duty predicted objective and subjective officer performance.</p>					
20 DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21 ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a NAME OF RESPONSIBLE INDIVIDUAL John L. O'Hare			22b TELEPHONE (Include Area Code) (202) 696-4502		22c OFFICE SYMBOL Code 1142PS

BLOCK 18 (continued)

Effectiveness; Fitness reports; USNA graduates; USN officers; Longitudinal design; LISREL procedures; Structural equations.

Transformational Leadership and Performance:

A Structural Equations Approach

Francis J. Yammarino, William D. Spangler, and Bernard M. Bass

Center for Leadership Studies and School of Management

State University of New York at Binghamton

Binghamton, NY 13901



Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

Running Head: Leadership and Performance

This manuscript was prepared under the Navy Manpower, Personnel, and Training R&D Program of the Office of the Chief of Naval Research under Contract N0001487K0434 to B.M. Bass and F.J. Yammarino, Co-Principal Investigators. The views expressed are those of the authors. We thank David Atwater, Jose Florendo, Sheeler Kowalewski, Scott Myers, Idell Neumann, and Anne Wahrenbrock for their assistance on the project.

Abstract

A model of leadership and performance was developed and tested with a sample of United States Navy Officers. A representative sample of a total of one hundred eighty-six graduates of the United States Naval Academy (USNA) who had been assigned to the surface warfleet participated in the study. Data concerning these officers were collected from USNA records, 793 senior subordinates of the officers, and the officers' superiors since time of commission. LISREL procedures were used to test the basic model and results provided support for the proposed conceptual model. Specifically, military performance while at the USNA predicted subsequent officer leadership and objective performance while in the fleet. Transformational leadership and laissez-faire officer leadership while on fleet duty predicted objective and subjective officer performance.

Transformational Leadership and Performance:

A Structural Equations Approach

In recent years, transformational leadership has become a well-known topic in psychology, management, sociology, and political science (Avolio & Bass, 1988; Bass, 1985; Bass & Avolio, 1989; Bass, Waldman, Avolio, & Bebb, 1987; Bradley, 1987; Burns, 1978; Conger & Kanungo, 1988; Hater & Bass, 1988; House, 1977; Howell & Frost, 1989; Kuhnert & Lewis, 1987; Waldman, Bass, & Einstein, 1987). Fundamental principles of transformational leadership appear in the work of Max Weber (1923/1963) on charismatic leadership and Downton (1973) on rebel leadership. But Burns (1978) was the first scholar to specify the distinction between transactional leaders who attempt to satisfy the current needs of followers by focusing attention on exchanges and transformational leaders who attempt to raise the needs of followers and promote dramatic changes of individuals, groups, and organizations.

Despite this plethora of work, empirical studies generally have been cross-sectional in nature and have examined the concurrent relationships between transformational or transactional leadership and leaders' performance. A key issue that has been largely ignored is the long-term connection between leadership and performance. In particular, while early performance can be predictive of future leadership, leadership potential, and subsequent performance (see Bass [1981] for a review), these longer-term linkages have not been examined empirically in research on transformational leadership.

Further, previous research has tended to measure leadership constructs and performance outcomes with one method, for example, a questionnaire at a

single point in time. Unfortunately, supportive results from these studies may be attributed either to the validity of the underlying model or to single-source response bias (e.g., Podsakoff & Organ, 1986; Spector, 1987; Williams, Cote, & Buckley, 1989). A final difficulty with previous research has been the tendency to use traditional methods of analysis, for example, simple regression techniques, rather than more recent LISREL techniques. A major advantage of LISREL techniques over traditional procedures is the capacity to test causal hypotheses free from the random error that affects more traditional tests of hypotheses (Cohen & Cohen, 1983, pp. 67-70, 174; Long, 1983a, 1983b; Joreskog & Sorbom, 1986).

Therefore, the present research was undertaken with three key objectives in mind: to provide a test of long-term longitudinal relationships between previous performance and subsequent leadership and performance, to take advantage of distinct methods of measuring relevant constructs, and to use LISREL to control for the effects of random error on tests of hypotheses.

Background and Conceptualization

Leadership and Performance

Most research on the leadership-performance connection has been conducted using a single source (e.g., subordinates) to report about leadership behavior and effectiveness at a single point in time (Bass, 1981; Yukl, 1989). Although some studies have used data collection techniques that involve multiple sources, few studies are longitudinal in nature, thus precluding statements about causality, or at least prediction, between leadership and performance. In the area of transformational leadership, long-term studies of leadership and performance have been limited to interview studies of high level executives and their influence on strategies

and cultures of organizations (e.g., Bennis & Nanus, 1985; Tichy & Devanna, 1986). Few, if any, long-term studies of middle or lower level leaders and their performance have been conducted.

Moreover, the leadership-performance connection is difficult to assess when all information about these dimensions is obtained from the same source--usually subordinates of the leader. Subordinates may hold stereotypes or implicit theories about what leadership and performance behaviors are associated (e.g., Eden & Leviatan, 1975; Rush, Thomas, & Lord, 1977). Likewise, subordinates may attribute positive behaviors to leaders who are perceived as effective without actual observation of those behaviors (e.g., Green & Mitchell, 1979; Lord, Binning, Rush, & Thomas, 1978). Essentially, subordinates' views of leadership may be systematically influenced by their perceptions of performance of themselves or their leaders. To address these difficulties, independent multi-source data for leadership and performance are necessary.

Thus, while the leadership-performance connection has been generally well established as positive in the literature (see Bass [1981] and Yukl [1989] for reviews), a long-term perspective and different source data appear to be the exception rather than the norm. This point is also relevant for much of the extant literature on transformational leadership. Given that past performance is often the best prediction of future performance and leadership (see Bass, 1981; Landy & Farr, 1983; Yukl, 1989), understanding of transformational leadership and current performance can be enhanced by examining its connection with prior performance.

Transformational and Transactional Leadership and Performance

Different theorists have proposed competing propositions about the interplay of transactional and transformational leadership. Burns (1978),

for example, claimed that transactional and transformational leadership are at opposites ends of the same continuum. That is, a leader could be either transactional or transformational, but not both. Besides making a distinction between transactional and transformational leadership, other theorists have proposed that they are somewhat complementary and both can potentially be displayed by the same leader (Bass, 1985; Conger & Kanungo, 1988; Kuhnert & Lewis, 1987). For example, Conger and Kanungo (1988) proposed that both contingent reward behavior (transactional leadership) and charisma (transformational leadership) could have the effect of empowerment on individual followers. Compatible with these views, transactional leadership was seen by Bass (1985) as being augmented by transformational leadership in its effects on performance. That is, transactional leadership provided the base for expected levels of performance, while transformational leadership built upon that base resulting in performance beyond expectations.

A transaction or exchange process is the basis of a commonly employed paradigm for the study of leadership (Evans, 1974; House & Mitchell, 1974; Graen & Cashman, 1975). The transactional leader recognizes subordinates' needs and desires and then clarifies how those needs and desires will be met in exchange for enactment of subordinates' work role. By clarifying what is required of subordinates, transactional leaders are able to build confidence in subordinates to exert the necessary effort to achieve expected levels of performance. Complementing this approach, transactional leaders also recognize what subordinates need and want, and clarify for them how those needs will be satisfied when subordinates expend the necessary effort to accomplish the leaders' objectives. Such effort to perform or motivation to work provides a sense of direction and, to a degree, energizes

subordinates to reach agreed-upon objectives.

Transactional leadership is compatible with path-goal theory (Evans, 1974; House, 1971; House & Mitchell, 1974). Likewise, the leader-member exchange model emphasizes role development of organizational members and the exchange of both tangibles and intangibles (Dienesch & Liden, 1986; Graen & Cashman, 1975; Kuhnert & Lewis, 1987). As such, a lower-order transaction involves the exchange of tangibles such as pay increases for goal accomplishment. A higher-order transaction involves the exchange of intangibles between leader and subordinate such as loyalty, affect, and trust (Kuhnert & Lewis, 1987).

In an active form, transactional leadership can be characterized as contingent reinforcement--rewards or avoidance of penalties contingent on effort expended and performance level achieved. A less active form of transactional leadership is management-by-exception or contingent negative reinforcement (Bass, 1981, 1985). In a review of leadership research on rewards and punishments, Podsakoff, Todor, Grover, and Huber (1984) determined that positive reward behavior that was contingent on subordinate performance led to higher levels of subordinate satisfaction and performance than punishment or noncontingent rewards. Contingent punishment behavior, while generally negative or non-effective, can have a positive effect on subordinate performance if combined with rewards as a form of "positive discipline" (Arvey & Ivancevich, 1980; Podsakoff, Todor, & Skov, 1982).

At the extreme end of inactivity by leaders is the well-known form of non-leadership, laissez-faire leadership. The negative association between a variety of leader and subordinate performance and effort indicators with laissez-faire leadership is well established in the extant literature (see

Bass, 1981).

At the extreme end of activity by leaders is the paradigm of leadership proposed by Burns (1978) and House (1977) and expanded on by Bass (1985). Superior leadership performance, transformational leadership, is seen when leaders broaden and elevate the interests of their subordinates, when they generate awareness and acceptance among the subordinates of the purposes and mission of the group, and when they move their subordinates to go beyond their own self-interests for the good of the group (Burns, 1978).

Transformational leaders motivate subordinates to do more than originally expected. They raise the consciousness of subordinates about the importance and value of designated outcomes and ways of reaching them, and in turn, get subordinates to transcend their own immediate self-interests for the sake of the mission and vision of the organization. Subordinates' confidence levels are raised and their needs are expanded. The heightened level of motivation is linked to three empirically derived factors of transformational leadership (Bass, 1985; Avolio & Bass, 1988; Bass & Avolio, 1989; Hater & Bass, 1988).

First, transformational leaders are more charismatic and inspiring in the eyes of their subordinates. Charismatic leaders have great referent power and influence, inspire loyalty to the organization, command respect, and have an ability to see what is important (vision). Charisma and inspiration provide subordinates with a mission and energize their responses. Subordinates want to identify with these leaders, develop intense feeling about them, and have a high degree of trust and confidence in them. Charismatic leaders excite, arouse, and inspire their subordinates (House, 1977). Charismatic qualities have been observed at all levels of organizations (Bass, 1985; Bass & Avolio, 1989).

A second component of transformational leadership is individualized consideration. Although a leader's charisma may attract subordinates to the mission or vision, the leader's use of individualized consideration also significantly contributes to subordinates achieving their fullest potential. The leader pays attention to individual differences in subordinates' needs for growth and development. The leader sets examples and assigns tasks on an individual basis not only to satisfy the immediate needs of subordinates, but also to elevate subordinates' needs and abilities to higher levels. Individualized consideration is, in part, coaching and mentoring and a method of communicating timely information to subordinates. It provides for continuous follow-up and feedback, and, perhaps more importantly, links an individual's current needs to the organization's mission, and elevates those needs when it is appropriate to do so (Bass, 1985).

A third component of transformational leadership is intellectual stimulation. An intellectually stimulating leader arouses in subordinates an awareness of problems, an awareness of their own thoughts and imagination, and a recognition of their beliefs and values. Intellectual stimulation is seen in subordinates' conceptualization, comprehension, and analysis of problems they face and solutions they generate. It is through intellectual stimulation of subordinates that new methods of accomplishing the organization's mission are explored. Leaders are willing and able to show subordinates new ways of looking at old methods (Bass, 1985).

The transformational leadership dimensions of individualized consideration and intellectual stimulation proposed by Bass (1985) may be similar to the higher-order "currencies of exchange" described by Dienesch and Liden (1986). That is, individualized consideration and intellectual stimulation may be shown to subordinates only when the leader receives

affect, stimulation, or commitment in return. Charisma, a third dimension of transformational leadership identified by Bass (1985), however, may not be exchanged-based. Charismatic leadership involves the articulation of an inspiring vision, engaging in exemplary acts which subordinates interpret as involving great personal risk and sacrifice, and instilling intense feelings and confidence in subordinates (Bass, 1985; Conger & Kanungo, 1987; House, 1977). Kuhnert and Lewis (1987) proposed that charismatic leaders have deeply held values that are not used as currencies of exchange. Rather, charismatic leaders are able to influence and inspire followers on the basis of these values.

In sum, transformational leaders may attain charisma or be inspiring in the eyes of their subordinates; transformational leaders may deal individually to meet the needs of each of their subordinates; and transformational leaders may intellectually stimulate their subordinates. Moreover, Bass and others (e.g., Bass, 1985; Bass & Avolio, 1989; Hater & Bass, 1988) have shown that the relationships between transformational leadership and leader and subordinate performance are stronger than relationships between transactional leadership and performance. In addition, a negative relationship between the same performance indicators and laissez-faire leadership has been shown in much prior work.

General Model and Hypotheses

To test hypotheses about performance and transformational and transactional leadership, data were collected on 186 officers in the United States Navy (USN). These data included military and academic performance while at the United States Naval Academy (USNA), aspects of transformational and transactional leadership measured subsequent to graduation from the USNA, and objective and subjective performance measures collected subsequent

to graduation from the USNA while in the fleet (see details below).

The general model which formed the basis of this research is summarized in Figure 1. Based on the above ideas and previously cited literature, particularly the work of Bass (1985), it was hypothesized that military and academic performance while at the USNA would strongly predict transformational leadership and be somewhat more weakly but positively related to transactional leadership (contingent promises and contingent rewards). Academic and military USNA performance were not expected to be related to active or passive management-by-exception (MBE) and were expected to be negatively related to laissez-faire leadership.

In the second part of the general model diagrammed in Figure 1, leadership variables were hypothesized to differentially predict performance; that is, objective fleet performance as rated by supervisors of the focal leaders and subjective performance as rated by subordinates of these focal leaders. In particular, transformational leadership was predicted to have a strong positive relationship to performance, transactional leadership was expected to have a weaker but positive relationship to performance, and laissez-faire leadership was hypothesized to be negatively related to performance.

Insert Figure 1 about here

A decision was made to use LISREL (Long, 1983a, 1983b; Joreskog & Sorbom, 1986) estimation techniques rather than standard regression procedures such as those described by Cohen and Cohen (1983, pp. 353-378). For the purposes of the present research, LISREL procedures had three advantages over traditional regression techniques. First, standard

regression procedures assume that variables are measured without error (Cohen & Cohen, 1983, pp. 67-70). In cases where random error is present in measures, estimates of causal relationships may be lower than their true population values. However, in the present research, it was likely that observed variables were measured with random error. LISREL procedures permit the estimation and statistical testing of causal parameters free from random error (Cohen & Cohen, 1983, p. 374). Second, with LISREL techniques, a number of measures of the goodness of fit of an entire model, such as that in Figure 1, may be calculated (Long, 1983a, 1983b). Third, a given model may be tested against some alternative model or models (Long, 1983a, 1983b).

The model tested in the present research was a LISREL model consisting of two submodels, a substantive model and a measurement model. The substantive submodel related USNA academic and military performance, types of leadership, and objective and subjective fleet performance. Academic and military performance were latent exogenous variables (ξ s), types of leadership and fleet performance were unobserved latent endogenous variables (η s). Arrows were causal pathways linking independent and dependent latent variables. Pathways linking exogenous variables with endogenous variables were designated γ s; for example γ_{61} , was the presumed effect of academic performance on subsequent leader objective performance. Causal pathways among the endogenous variables were designated β s; for example, the hypothesized effect of transformational leadership on subjective performance was β_{71} . In Figure 1, the various hypothesized pathways are displayed but the labels, that is the γ s and the β s, are not shown given the complexity of the figure.

Charisma, inspirational leadership, individual consideration, and intellectual stimulation defined a single latent or unobserved

transformational leadership factor. These four variables (described below) were combined for two reasons. First, the four variables were highly correlated and each had similar correlations with other variables in previous research (e.g., Bass & Avolio, 1989). Evidently, they are aspects of a single underlying leadership construct. Second, multicollinearity among independent variables creates problems of interpretation for both traditional regression techniques (Cohen & Cohen, 1983, pp. 115-116; Lewis-Beck, 1980) as well as LISREL (Joreskog & Sorbom, 1986), a problem which may be avoided by consolidating the highly correlated variables. For similar reasons, contingent promises and contingent rewards loaded on a single latent transactional leadership factor, two available measures of focal leader performance as rated by superiors defined an objective fleet performance latent factor, and effectiveness and satisfaction as rated by each officer's subordinates constituted a subjective fleet performance factor. USNA academic and military performance were allowed to be mutually correlated exogenous variables.

The second component of Figure 1 is a measurement submodel. Ovals represent latent causal variables in the model, and squares represent observed measures of these unobserved constructs. For example Y_1 through Y_{44} were questionnaire measures of aspects of focal officer leadership. Each of the observed variables was assumed to be a function of an underlying latent variable and a random error term (δ in the case of exogenous variables and ϵ in the case of endogenous variables). λ^X s linked latent exogenous variables to observed measures, and λ^Y s related endogenous variables to their measures. These λ s are not shown on Figure 1 in order to simplify the diagram of the basic model.

All error terms were assumed to be randomly distributed and

uncorrelated with other error terms. Specifically, errors of measurement of academic and military performance were assumed to be uncorrelated with errors of leadership measures and measures of objective and subjective fleet performance. Errors of measurement of leadership variables were assumed to be uncorrelated with errors in the measurement of objective and subjective fleet performance.

These three assumptions are critical to interpreting the LISREL output. For example, the general model predicted that transformational leadership would be significantly related to objective performance. If errors of measurement of these two constructs were positively correlated, then a significant estimated parameter might be found in the absence of any causal relationship between transformational leadership and objective performance. In the present case, academic and military performance were measured, depending on the officers' years of commission, four to ten years before leadership and fleet performance by different individuals using distinct methods, so the assumption of uncorrelated errors is reasonable. Likewise, leadership variables and objective performance were measured by different methods and individuals at separate points in time. However, subjective performance (perceived effectiveness and subordinate satisfaction) and leadership variables were measured at a single point in time as rated by the subordinates of the focal leaders using a single instrument, so estimated parameters relating leadership and subjective performance might well reflect correlated errors among the measures as well as a substantive relationship between the underlying latent variables (see details below).

Method

Sample

The focal leaders for this study were all USN officers who were USNA

graduates on active duty assigned to the surface warfare fleet. The USNA and Navy Personnel Research and Development Center (NPRDC) staffs randomly selected a representative sample of 276 officers to participate in the study. Of these, 186 actually participated, yielding a response rate of about 67%.

The focal officers were commissioned in 1978 (n = 36), 1979 (n = 31), 1983 (n = 51), and 1984 (n = 68), and held the ranks of 0-2 or Lieutenants Junior Grade (n = 71) and 0-3 or Lieutenants (n = 114); there was one Lieutenant Commander (0-4). All but one of the officers were males, and they were primarily 25-30 years (n = 120) and 31-35 years (n = 45) in age. They were assigned to a variety of types and sizes of ships.

Information about the focal officers was obtained from three sources: USNA records, senior subordinates of the officers, and officers' superiors. Although details about the officers' superiors were not available, 5.84 reports on average about the focal officers were provided by a number of superiors over several years in a variety of assignments. This information was compiled by the NPRDC. Six senior subordinates of each officer also were randomly selected and asked to provide information anonymously about the officers. For officers who had less than six subordinates, all their senior subordinates were asked to provide information. In all, 793 subordinates of the focal officers participated, yielding an average of 4.26 subordinates per officer.

All subordinate survey materials were sent to the Commanding Officer (CO) of the ship on which the focal officers were serving. The CO was asked to relay the materials to the appropriate senior subordinates of the focal officers. All returns were made directly to the researchers. The subordinates who provided information about the officers were approximately

93% males. Most were 21-25 years ($n = 213$), 26-30 years ($n = 220$), or 31-39 years ($n = 275$) in age. Most of the subordinates held the ranks of E-4 to E-6 ($n = 171$), E-7 to E-9 ($n = 191$), or O-1 to O-2 ($n = 362$), and generally had worked with the focal officers for three to six months ($n = 184$), seven months to one year ($n = 243$), or one to two years ($n = 255$).

Measures

USNA performance. Two early performance measures were obtained from the USNA records for the officers' four years at the Academy prior to being commissioned as officers (1974-1978, 1975-1979, 1979-1983, or 1980-1984).

Academic performance is analogous to a cumulative quality or grade point average based on grades obtained and quality points for those grades. It includes all courses completed during four years at the USNA. Military performance is analogous to a cumulative quality point score based on performance in professional, military, and physical education courses completed during four years at the USNA as well as the Second Class Summer evaluation, annual Professional Competency Review, and the semester-by-semester conduct scores. The exact formulation of these scores is a weighted combination of grades, quality points, and coefficients (values) of the components. Military performance grades are the most heavily weighted in this index.

Leadership. The leadership data were collected in 1988 using a slightly modified version of the Multifactor Leadership Questionnaire (MLQ) that was developed by Bass (1985) and has been described in detail elsewhere (Avolio & Bass, 1988; Bass & Avolio, 1989; Hater & Bass, 1988). In this study, the content was changed wherever necessary to better suit the military setting. This version of the survey was previously tested using a sample of 318 senior officers attending the Naval War College who described

their most recent immediate superiors. The modified scales displayed adequate reliability, and the means, standard deviations, and correlations among the scales followed the same pattern as those for previous versions of the survey.

Senior subordinates completing the surveys indicated how frequently they observed behaviors of the focal officers and also reactions to the focal officers on a five-point format ranging from "not at all" (0) to "frequently, if not always" (4). These anchors have a magnitude estimation-based ratio to each other of 4:3:2:1:0 (Bass, Cascio, & O'Connor, 1974). For each scale, items were summed and divided by the appropriate number of items forming a scale score that ranged from zero to four.

Nine leadership scales were created for use in the current study. The four transformational leadership scales, the number of items in each, and examples of the items were:

1. Charisma (6 items) - "I am ready to trust him/her to overcome any obstacle."
2. Individualized Consideration (6 items) - "Gives personal attention to me when necessary."
3. Intellectual Stimulation (6 items) - "Shows me how to think about problems in new ways."
4. Inspirational Leadership (6 items) - "Provides vision of what lies ahead."

The four transactional leadership scales, the number of items in each, and examples of the items were:

5. Contingent Promises (3 items) - "Talks about special commendations and promotions for good work."
6. Contingent Rewards (3 items) - "Personally pays me a compliment

when I do good work."

7. Active Management-by-Exception (4 items) - "Would reprimand me if my work was below standard."
8. Passive Management-by-Exception (4 items) - "Shows he/she is a firm believer in 'if it ain't broke, don't fix it'."

The non-leadership scale was:

9. Laissez-Faire (6 items) - "However I do my job is OK with him/her."

Fleet performance. The performance of the focal officers while in the fleet was evaluated using different instruments and two sources. First, as part of the MLQ data collected from senior subordinates in 1988, several items were used to assess two measures of subjective performance. Items were summed and divided by the appropriate number of items to form scale scores that ranged from zero to four. These included:

1. Satisfaction--Two items were used to measure subordinates' satisfaction with their leader. For example, "In all, how satisfied were you that the methods of leadership used by this officer were the right ones for getting your unit's job done?" Response alternatives were on a five-point format ranging from "very dissatisfied" (0) to "very satisfied" (4).
2. Effectiveness--Four items were used to measure the effectiveness of the focal officer. For example, "How effective is this officer in meeting the job-related needs of his/her subordinates?" Response alternatives were on a five-point format ranging from "not effective" (0) to "extremely effective" (4).

Second, objective performance data were collected from the year of the officers' commission (1978, 1979, 1983, or 1984) to 1988 by the USN while

the officers were on active duty with the fleet. This information was provided by various superiors of the focal officers over a number of years in a variety of job assignments. The NPRDC compiled this information in terms of two key performance measures. For one of the measures, superiors evaluated each focal officer each year since time of commission on a nine-point scale. The evaluation assesses "the officer's performance with regard to contributions to the unit's mission, including effective integration of personnel and the mission and completion of assigned tasks." The number of times an officer was given the highest rating on this scale was divided by the total number of evaluations he/she had received over the past several years from various superiors to produce an average superior-rated performance evaluation. This cumulative average score could range from .00 to 1.00. As a part of the evaluation procedure each year, on a second measure, focal officers were either recommended or not recommended for early promotion as "a consequence of the officer's exhibited performance and potential during the evaluation period." The number of times that an officer was recommended was divided by the total number of evaluations to produce an average superior-recommended early promotion score. This score also could range from .00 to 1.00.

Analyses

For each leadership measure and for subordinate-rated satisfaction and effectiveness, a one-way ANOVA was employed to compare within-leaders variance to between-leader variance (see Katz & Allen, 1985; Sheridan & Vredenburgh, 1978). Bartlett's M-test also was used to examine the homogeneity of within-leader variance. Each measure passed both tests in that between-leader variance was highly significant and within-leader variance was homogeneous. These tests provided support for combining

subordinates' perceptions to produce averaged, aggregated scores for respective focal leaders. Thus, all subsequent analyses were based on a sample size of 186.

Several LISREL-based statistics were used to test the general Figure 1 model as well as specific hypotheses derived from it. The general model was estimated using a maximum likelihood procedure, the null model of no relationships among the latent variables was similarly estimated, and a difference of chi-square test (Long, 1983a, 1983b) was used to test the overall hypothesis that the general model found in Figure 1 provided a better fit to the data than the null model. Specific hypotheses were tested by means of one-tailed t -tests of specific parameters. For example, the hypothesis that transformational leadership was positively related to objective performance was tested by means of a t -test on the parameter β_{61} . The measurement model was tested by means of significance tests on the factor loadings λ_{Ys} . A number of other measures of model adequacy were examined. Coefficients of determination for variables and equations should be between 0 and 1.00, variances should be positive, and correlations should fall in the range of -1.00 to 1.00 (Long, 1983a, 1983b).

Results

The results for this study are summarized in Tables 1 through 3. Descriptive statistics (reliabilities, means, standard deviations) for USNA academic and military performance, leadership scales, and fleet performance measures are presented in Table 1. Correlations among the measures are presented in Table 2. Results of tests of hypotheses developed in this study using LISREL with maximum likelihood estimation are displayed in Table 3.

Insert Tables 1, 2, and 3 about here

As shown in Table 2, charisma, individualized consideration, intellectual stimulation, and inspirational leadership were highly correlated. Further, each measure had approximately the same pattern of intercorrelations with other measures in the study. Likewise, contingent promises and contingent rewards, effectiveness and satisfaction, and early promotion and performance evaluation were highly correlated with each other, respectively, and had similar correlations with other measures. These patterns of correlations suggested that the highly correlated sets of scales might be viewed as multiple measures of more general constructs. Also, high correlations among measures make maximum likelihood estimation and hypothesis testing difficult (Joreskog & Sorbom, 1986). Therefore, for the purpose of testing the hypotheses of this investigation, items measuring charisma, individualized consideration, intellectual stimulation, and inspirational leadership were combined into a single scale of transformational leadership; contingent promises and contingent reward items were combined into a single scale of contingent promises and rewards; early promotion and performance evaluation were combined into a scale of objective fleet performance; and effectiveness and satisfaction items were used to form a measure of subjective fleet performance.

The overall model developed here and diagrammed in Figure 1 was tested using LISREL and maximum likelihood estimation. Estimation of the overall model produced a chi-square statistic of 3786.36 ($df = 1354$) and a goodness-of-fit index of .538. The goodness-of-fit index is a measure of the relative amount of variances and covariances jointly accounted for by the

general model that was developed. It should vary between zero and 1.00 (Joreskog & Sorbom, 1986). The null model was defined to be the general model with all coefficients among latent variables fixed at zero. This null model also was estimated and a chi-square of 12081.39 ($df = 1385$) was obtained. The difference of chi-square statistic was, therefore, 8295.03 with 31 degrees of freedom, significant at less than .001. Thus, the hypothesis of no relationship among the latent variables in the overall model was rejected in favor of the alternative that there were relationships among academic and military performance, leadership variables, and subjective and objective fleet performance. Moreover, no instances of negative variances, coefficients of determination less than zero or greater than 1.00, and no correlations greater than 1.00 or less than -1.00 were found.

Specific hypotheses were tested by means of t -tests of structural coefficients from the LISREL analysis. The results of these specific tests are presented in Table 3. Contrary to hypothesis, USNA academic performance did not significantly predict any aspect of leadership. As expected, USNA military performance predicted transformational and laissez-faire leadership.

The strongest results in the present study were found for the prediction of objective and subjective officer fleet performance by the leadership indices and by USNA performance. Objective fleet performance was positively predicted by USNA military performance and transformational leadership, and negatively predicted by laissez-faire leadership. As expected, active and passive management-by-exception were not significantly related to objective performance. However, contingent promises and rewards and USNA academic performance failed to significantly predict objective

fleet performance. Overall, these variables accounted for 28% of the variance in the objective fleet performance index. Likewise, transformational leadership and laissez-faire leadership predicted 93 percent of the variance in subjective officer fleet performance as measured by the effectiveness and satisfaction items. Transformational leadership accounted for the larger portion of this prediction.

The LISREL results also provided support for the measurement submodel found in Figure 1. Of 52 t -tests of the λ^2 factor loadings, 50 were significant at less than .001, one-tailed. These results are not shown to conserve space.

Discussion

The purpose of this study was to develop and test a model of the long-term connection between leadership and performance of Naval Officers. Building on prior research (e.g., Bass, 1981, 1985; Yukl, 1989), USNA performance was linked to subsequent leadership and fleet performance, measurements were obtained from multiple sources using distinct instruments at different points in time, and LISREL was used to control the effects of random error on tests of the hypotheses. The LISREL results provided support for the measurement submodel, the overall substantive model, and in terms of the structural coefficients, several of the specific hypotheses linking the variables that were investigated.

Although academic performance at the USNA was not a significant predictor of subsequent leadership and performance, USNA military performance was predictive of leadership (transformational and laissez-faire) and objective fleet performance four to ten years post graduation from the Naval Academy. These effects are interesting not only for their long-term time horizon, but also because the measures were obtained from

distinct instruments and three different sources (USNA personnel, focal officers' subordinates, and superiors of the focal officers) at multiple points in time. These findings highlight the importance of prior performance in the identification of both leadership and subsequent performance. Note that such prior performance, to be useful as a predictor of future behaviors, was something more than merely academic grades. The military performance measure included conduct and competencies beyond that of USNA course grades and may reflect prototypical behaviors associated with effective military leadership.

Transformational and laissez-faire leadership were both predictive of objective and subjective fleet performance. While the leadership-subjective performance connection may be due to same-source (common-method) bias, this is not the case for the leadership-objective performance linkage which was based on subordinates' and superiors' reports about the focal officers at different points in time. As expected, management-by-exception (active and passive) was not associated with fleet performance. However, transactional leadership, in the form of contingent rewards and promises, also was not linked to fleet performance based on the observed structural coefficients. This latter result is somewhat surprising given prior research (e.g., Dienesch & Liden, 1986; Podsakoff, et al., 1982, 1984), and may be due to the nature of the sample or the specific measurements used in this study.

A key finding is the structural equation in which objective fleet performance was significantly predicted by USNA military performance and transformational and laissez-faire leadership. This result involves multiple raters using distinct instruments at different points in time. As such, it can be viewed as representing the "purest" connection between

leadership and performance from a long-term longitudinal perspective. This finding, while compatible with prior work on transformational leadership (e.g., Bass 1985; Bass & Avolio, 1989; Hater & Bass, 1988) and the leadership-performance connection (see Bass, 1981; Yukl, 1989), extends that work by eliminating effects that may be contaminated by same-source bias (e.g., Podsakoff & Organ, 1986; Williams, et al., 1989) or that may be simply artifacts of data collected cross-sectionally.

A practical implication of these results is that the early identification of high-performing individuals can be useful in helping to determine who will be effective leaders in the future. Compatible with other work (e.g., Bass, 1981; Landy & Farr, 1983), the assessed performance of individuals should be specifically job-related (rather than general performance) and assessments should be made of transformational and laissez-faire leadership. Because these two types of leadership represent extreme end points of the leadership activity continuum (Bass, 1985), perhaps raters may be better able to assess these prototypical forms of leadership (very active and very inactive, respectively) than transactional leadership. This speculation provides another potential reason why transactional leadership (contingent rewards and promises) was not predicted by early performance nor predictive of subsequent performance.

These ideas could be the subject of future research. In addition, future work on the long-term leadership-performance connection could include different types of organizations and leaders. Admittedly, Naval Officers are a very select group of individuals engaged in a variety of unique job activities. Whether the results from this study are generalizable to civilian work organizations and supervisors or managers at various levels of management remains an open question. Another direction for future

investigations could be to assess frequently and continuously both leadership (transformational, transactional, and laissez-faire) and performance for the same individuals over a long period of time using different methods. This more complete design would permit questions of causality as well as method bias to be more fully answered than in the present study. Nevertheless, in the current study, some first steps have been taken to understand the long-term connection between leadership, especially transformational leadership, and performance using multi-source data and a rigorous structural equations procedure.

References

- Arvey, R.D., & Ivancevich, J.M. (1980). Punishment in organizations: A review, propositions, and research suggestions. Academy of Management Review, 5, 123-132.
- Avolio, B.J., & Bass, B.M. (1988). Transformational leadership, charisma and beyond. In J.G. Hunt, B.R. Baliga, H.P. Dachler, & C.A. Schriesheim (Eds.), Emerging leadership vistas (pp. 29-50). Lexington, MA: Lexington Books.
- Bass, B.M. (1985). Leadership and performance beyond expectations. New York: Free Press.
- Bass, B.M., & Avolio, B.J. (1989). The multifactor leadership questionnaire. Palo Alto, CA: Consulting Psychologists Press.
- Bass, B.M., Cascio, W.F., & O'Connor E. (1974). Magnitude estimations of frequency and amount. Journal of Applied Psychology, 59, 313-320.
- Bass, B.M., Waldman, D.A., Avolio, B.J., & Bebb, M. (1987). Transformational leadership and the falling dominoes effect. Group and Organization Studies, 12, 73-87.
- Bennis, W.G., & Nanus, B. (1985). Leaders: The strategies for taking charge. New York: Harper & Row.
- Bradley, R.T. (1987). Charisma and social structure. New York: Paragon House.
- Burns, J.M. (1978). Leadership. New York: Harper.
- Cohen, P., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum.
- Conger, J.A., & Kanungo, R.N. (1988). Charismatic leadership. San Francisco, CA: Jossey-Bass.
- Dienesch, R.M., & Liden, R.C. (1986). Leader-member exchange model of

- leadership: A critique and further development. Academy of Management Review, 11, 618-634.
- Downton, J.V. (1973). Rebel leadership: Commitment and charisma in the revolutionary process. New York: Free Press.
- Eden, D., & Leviatan, U. (1975). Implicit leadership theory as a determinant of the factor structure underlying supervisory behavior scales. Journal of Applied Psychology, 60, 736-741.
- Evans, M.G. (1974). Extensions of the path-goal theory of motivation. Journal of Applied Psychology, 59, 172-178.
- Graen, G., & Cashman, J.F. (1975). A role-making model of leadership in formal organizations: A developmental approach. In J.G. Hunt & L.L. Larsons (Eds.), Leadership frontiers. Carbondale, IL: Southern Illinois University Press.
- Green, S.G., & Mitchell, T.R. (1979). Attributional processes of leaders in leader-member exchanges. Organizational Behavior and Human Performance, 23, 429-458.
- Hater, J., & Bass, B.M. (1988). Superiors' evaluations and subordinates' perceptions of transformational and transactional leadership. Journal of Applied Psychology, 73, 695-702.
- House, R.J. (1971). A path-goal theory of leadership effectiveness. Administrative Science Quarterly, 16, 321-338.
- House, R.J. (1977). A 1976 theory of charismatic leadership. In J.G. Hunt & L.L. Larson (Eds.), Leadership: The cutting edge (pp. 189-207). Carbondale, IL: Southern Illinois University Press.
- House, R.J., & Mitchell, T.R. (1974). Path-goal theory of leadership. Journal of Contemporary Business, 5, 81-97.
- Howell, J.M., & Frost, P.J. (1989). A laboratory study of charismatic

- leadership. Organizational Behavior and Human Decision Processes, 43, 243-269.
- Joreskog, K.G., & Sorbom, D. (1986). Analysis of linear structural relationships by maximum likelihood, instrumental variables, and least squares methods. Mooresville, IN: Scientific Software.
- Katz, R., & Allen, T.J., (1985). Project performance and the locus of influence in the R&D matrix. Academy of Management Journal, 28, 67-87.
- Kuhnert, K.W., & Lewis, P. (1987). Transactional and transformational leadership: A constructive/developmental analysis. Academy of Management Review, 12, 648-657.
- Landy, F.J., & Farr, J.L. (1983). The measurement of work performance: Methods, theory and applications. New York: Academic Press.
- Lewis-Beck, M.S. (1980). Applied regression: An introduction. Beverly Hills, CA: Sage.
- Long, J.S. (1983a). Confirmatory factor analysis: A preface to LISREL. Beverly Hills, CA: Sage.
- Long, J.S. (1983b). Covariance structure models: An introduction to LISREL. Beverly Hills, CA: Sage.
- Lord, R.G., Binning, J.F., Rush, M.C., & Thomas, J.C. (1978). The effect of performance cues and leader behavior on questionnaire ratings of leader behavior. Organizational Behavior and Human Performance, 21, 27-39.
- Podsakoff, P.M., & Organ, D.W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management, 12, 531-544.
- Podsakoff, P.M., Todor, W.D., Grover, R.A., & Huber, V.L. (1984). Situational moderators of leader reward and punishment behavior: Fact or fiction? Organizational Behavior and Human Performance, 34, 21-63.

- Podsakoff, P.M., Todor, W.D., & Skov, R. (1982). Effects of leader contingent and noncontingent reward and punishment behaviors on subordinate performance and satisfaction. Academy of Management Journal, 25, 810-821.
- Rush, M.C., Thomas, J.C., & Lord, R.G. (1977). Implicit leadership theory: A potential threat to the internal validity of leader behavior questionnaires. Organizational Behavior and Human Performance, 20, 93-110.
- Sheridan, J.E., & Vredenburgh, D.J. (1978). Predicting leadership behavior in a hospital organization. Academy of Management Journal, 21, 679-689.
- Spector, P.E. (1987). Method variance as an artifact in self-report affect and perceptions at work: Myth or significant problem? Journal of Applied Psychology, 72, 438-443.
- Tichy, N.M., & Devanna, M.A. (1986). The transformational leader. New York: Wiley.
- Waldman, D.A., Bass, B.M., & Einstein, W.O. (1987). Leadership and outcomes of performance appraisal processes. Journal of Occupational Psychology, 60, 177-186.
- Weber, M. (1926/1963). The sociology of religion. Beacon, NY: Beacon Press.
- Williams, L.J., Cote, J.A., & Buckley, M.R. (1989). Lack of method variance in self-reported affect and perceptions at work: Reality or artifact?
- Yukl, G.A. (1989). Leadership in organizations. Englewood Cliffs, NJ: Prentice Hall.

Table 1

Descriptive Statistics for the Measures

Measure	α	M	SD
<u>USNA Performance</u>			
Academic Performance	NA	2.62	.41
Military Performance	NA	2.92	.36
<u>Leadership</u>			
Charisma	.92	2.48	1.27
Individualized Consideration	.84	2.66	1.17
Intellectual Stimulation	.86	2.63	1.15
Inspirational Leadership	.82	2.45	1.15
Transformational Leadership ^a	.95	2.56	1.07
Contingent Promises	.62	1.88	1.38
Contingent Rewards	.90	2.59	1.52
Contingent Promises and Rewards ^b	.86	2.24	1.34
Mgt.-by-Exception--Active	.76	2.92	1.29
Mgt.-by-Exception--Passive	.61	2.47	1.10
Laissez-Faire Leadership	.67	1.49	.99
<u>Fleet Performance</u>			
Early Promotion	NA	.46	.35
Performance Evaluation	NA	.68	.34
Objective Performance ^c	.80	.58	.30
Effectiveness	.88	2.81	1.06
Satisfaction	.94	3.00	1.59
Subjective Performance ^d	.90	2.88	1.13

NA = Not applicable.

^aAverage of six charisma, six individualized consideration, six intellectual stimulation, and six inspirational leadership items.^bAverage of three contingent promises and three contingent rewards items.^cAverage of early promotion and performance evaluation scores.^dAverage of four effectiveness and two satisfaction items.

Table 2

Correlations Among U.S. Naval Academy Performance, Leadership, and Fleet Performance

	PAP	PMP	LCH	LIC	LIS	LIL	LTR	LCP	LCR	CPR	LMA	LMP	LLF	CEF	CST	SPR	CEP	OPR
PAP	1.00																	
PMP	.70	1.00																
LCH	.07	.18	1.00															
LIC	.02	.06	.80	1.00														
LIS	.05	.10	.78	.71	1.00													
LIL	.09	.14	.84	.83	.83	1.00												
LTR	.07	.14	.94	.90	.89	.94	1.00											
LCP	.05	.03	.61	.62	.60	.67	.69	1.00										
LCR	.11	.12	.72	.80	.65	.78	.80	.61	1.00									
CPR	.10	.09	.75	.81	.70	.82	.83	.88	.92	1.00								
LMA	.14	.13	.46	.41	.62	.52	.54	.39	.42	.45	1.00							
LMP	-.11	-.10	.14	.18	.10	.17	.17	.16	.16	.17	-.04	1.00						
LLF	-.06	-.06	-.57	-.54	-.67	-.56	-.63	-.33	-.45	-.45	-.57	.15	1.00					
CEF	.04	.17	.87	.73	.74	.79	.86	.48	.66	.65	.50	.11	-.60	1.00				
CST	.04	.12	.89	.81	.73	.82	.89	.53	.72	.72	.44	.19	-.55	.86	1.00			
SPR	.05	.17	.91	.78	.76	.83	.90	.54	.71	.70	.49	.17	-.60	.98	.95	1.00		
CEP	.12	.25	.37	.24	.34	.28	.35	.17	.24	.25	.28	-.04	-.31	.38	.25	.35	1.00	
CPE	.08	.23	.38	.21	.31	.25	.32	.17	.20	.20	.22	-.05	-.31	.37	.29	.35	.65	1.00
OPR	.11	.27	.41	.25	.36	.30	.37	.19	.24	.25	.27	-.04	-.34	.42	.30	.39	.91	1.00

PAP = USNA academic performance; PMP = USNA military performance; LCH = charisma; LIC = individualized consideration; LIS = intellectual stimulation; LIL = inspirational leadership; LTR = transformational leadership; LCP = contingent promises; LCR = contingent rewards; CPR = mean of contingent promises and contingent rewards items; LMA = management-by-exception-active; LMP = management-by-exception-passive; LLF = laissez-faire; CEF = effectiveness; CST = satisfaction; SPR = mean of effectiveness and satisfaction items; CEP = early promotion; CPE = performance evaluation; OPR = mean of early promotion and performance evaluation.

Table 3

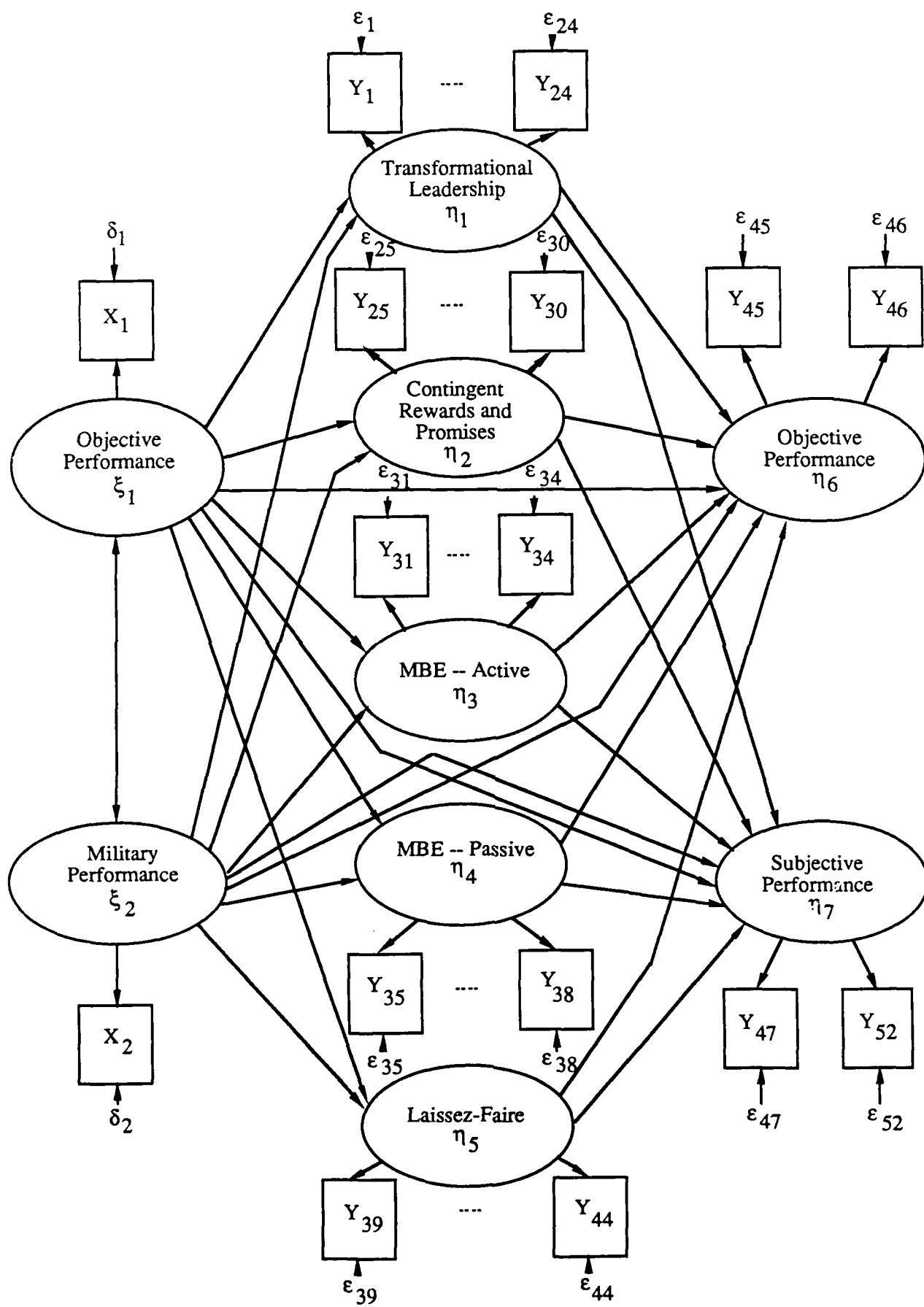
Tests of Hypotheses Relating U.S. Naval Academy Performance, Leadership, and Fleet Performance

Dependent Variable	R ²	Independent Variable	Predicted Sign	Structural Coefficient	Observed Coefficient
Transformational Leadership (η_1)	.03	Academic Performance (ξ_1)	++	γ_{11}	-.081
		Military Performance (ξ_2)	++	γ_{12}	.204*
Contingent Promises and Rewards (η_2)	.02	Academic Performance (ξ_1)	+	γ_{21}	.043
		Military Performance (ξ_2)	+	γ_{22}	.055
Mgt.-by-Exception--Active (η_3)	.01	Academic Performance (ξ_1)	0	γ_{31}	.038
		Military Performance (ξ_2)	0	γ_{32}	.038
Mgt.-by-Exception--Passive (η_4)	.02	Academic Performance (ξ_1)	0	γ_{41}	-.042
		Military Performance (ξ_2)	0	γ_{42}	-.042
Laissez-Faire (η_5)	.03	Academic Performance (ξ_1)	-	γ_{51}	.008
		Military Performance (ξ_2)	-	γ_{52}	-.068*
Objective Performance (η_6)	.28	Academic Performance (ξ_1)	+	γ_{61}	-.109
		Military Performance (ξ_2)	+	γ_{62}	.243**
		Transformational Leader. (η_1)	++	β_{61}	.303***
		Cont. Prom. and Rewards (η_2)	+	β_{62}	-.131
		Mgt.-by-Exception--Active (η_3)	0	β_{63}	.053
		Mgt.-by-Exception--Passive (η_4)	0	β_{64}	-.126
		Laissez-Faire (η_5)	-	β_{65}	-.471*
Subjective Performance (η_7)	.93	Academic Performance (ξ_1)	+	γ_{71}	-.034
		Military Performance (ξ_2)	+	γ_{72}	.026
		Transformational Leader. (η_1)	++	β_{71}	.807***
		Cont. Prom. and Rewards (η_2)	+	β_{72}	-.052
		Mgt.-by-Exception--Active (η_3)	0	β_{73}	-.016
		Mgt.-by-Exception--Passive (η_4)	0	β_{74}	.054
		Laissez-Faire (η_5)	-	β_{75}	-.279***

* $p < .05$, one-tailed
 ** $p < .01$, one-tailed
 *** $p < .001$, one-tailed

Figure Caption

Figure 1. U.S. Naval Academy performance and subsequent leadership and fleet performance of U.S. Naval Officers.



Distribution List for Manpower, Personnel, and Training Programs Reports

Director Research Programs
Office of Naval Research (Code 11)
Arlington, VA 22217-5000

Chairman, MPT R&D Committee
Office of the Chief of Naval Research
Code 222
Arlington, VA 22217-5000

Program Manager, Statistics and
Probability (Code 1111SP)
Office of Naval Research
Arlington, VA 22217-5000

Director, Life Sciences (Code 114)
Office of Naval Research
Arlington, VA 22217-5000

Director, Cognitive & Neural Sciences
(Code 1142)
Office of Naval Research
Arlington, VA 22217-5000

Cognitive Science (Code 1142CS)
Office of Naval Research
Arlington, VA 22217-5000

Perceptual Science (Code 1142PS)
Office of Naval Research
Arlington, VA 22217-5000

Biological Intelligence (Code 1142BI)
Office of Naval Research
Arlington, VA 22217-5000

Director, Applied Research
Division (Code 121)
Office of the Chief of Naval Research
Arlington, VA 22217-5000

Defense Technical Information Center
DTIC/DDA-2
Cameron Station, Building 5
Alexandria, VA 22314 (12 copies)

Science and Technology Division
Library of Congress
Washington, DC 20540

Commanding Officer
Naval Research Laboratory
Code 2627
Washington, DC 20375

Office of the Deputy Assistant Secretary
of the Navy (Manpower & Reserve Affairs)
5D800, The Pentagon
Washington, DC 20350-1000

Assistant for Long Range Requirements
CNO Executive Panel (Op-00K)
4401 Ford Avenue
Alexandria, VA 22302-0268

Head, Manpower, Personnel, and
Training Branch
Office of the CNO (Op-813)
4A478, The Pentagon
Washington, DC 20350-1000

Assistant for Manpower and Training
Office of the CNO (Op-987H)
5D772, The Pentagon
Washington, DC 20350

Assistant for Planning and Technology
Development
Office of the DCNO(MPT) (Op-01B2)
Department of the Navy
Washington, DC 20350-2000

Deputy Director Total Force Training
and Education Division
Office of the DCNO(MPT) (Op-11B)
Department of the Navy
Washington, DC 20370-2000

Assistant for Training Technology and
Human Factors
Office of the DCNO(MPT) (Op-11B1)
Department of the Navy
Washington, DC 20350-2000

Deputy Director Military Personnel
Policy Division
Office of the DCNO(MPT) (Op-13B)
Department of the Navy
Washington, DC 20370-2000

Head, Military Compensation Policy Branch
Office of the DCNO(MPT) (Op-134)
Department of the Navy
Washington, DC 20370-2000

Director, Navy Family Support Program Office
of the DCNO(MPT) (Op-156)
1300 Wilson Boulevard, Room 828
Arlington, VA 22209

Headquarters U.S. Marine Corps
Code MA
Washington, DC 20380-0001

Head, Leadership Branch
Naval Military Personnel Command
Attn: LCDR E. Marits, NMPC-621
Department of the Navy
Washington, DC 20370-5620

Director, Recreational Services Department
Naval Military Personnel Command (N-651C)
1300 Wilson Boulevard, Room 932
Arlington, VA 22209

Deputy Director Manpower, Personnel
and Training Division
Naval Sea Systems Command
Attn: Code CEL-MP63
Washington, DC 20362

Director, Research & Analysis Division
Navy Recruiting Command (Code 223)
4015 Wilson Boulevard, Room 215
Arlington, VA 22203-1991

Naval School of Health Sciences
National Naval Medical Center (Bldg. 141)
Washington, DC 20814-5033
Attn: CDR J. M. LaRocco

Technical Director
Naval Health Research Center
P.O. Box 85122
San Diego, CA 92138-9174

Deputy Director, R&D Department
Naval Training Systems Center (Code 7A)
12350 Research Parkway
Orlando, FL 32826-3224
Attn: Dr. David E. Daniel

Head, Human Factors Laboratory
Naval Training Systems Center (Code 71)
12350 Research Parkway
Orlando, FL 32826-3224

Human Factors Division (Code 712)
Naval Training Systems Center
12350 Research Parkway
Orlando, FL 32826-3224
Attn: Dr. Eduardo Salas

Commanding Officer
Navy Personnel R&D Center
San Diego, CA 92152-6800

Technical Director
NPRDC (Code 01)
San Diego, CA 92152-6800

Head, Fleet Liaison Department
NPRDC (Code 03)
San Diego, CA 92152-6800

Head, Training Technology Department
NPRDC (Code 15)
San Diego, CA 92152-6800

Head, Training Systems Department
NPRDC (Code 14)
San Diego, CA 92152-6800

Head, Manpower Systems Department
NPRDC (Code 11)
San Diego, CA 92152-6800

Head, Personnel Systems Department
NPRDC (Code 12)
San Diego, CA 92152-6800

Head, Testing Systems Department
NPRDC (Code 13)
San Diego, CA 92152-6800

Naval Ocean Systems Center
Command Support Technology Division
Attn: Mr. Jeffrey Grossman, Code 4402
Bldg. 334
San Diego, CA 92152-5000

Chairman, Department of Administrative
Sciences (Code 54)
Naval Postgraduate School
Monterey, CA 93943-5100

Chairman, Department of Operations
Research (Code 55)
Naval Postgraduate School
Monterey, CA 93943-5100

Director, Instructional Development and
Educational Program Support Department
Naval Education and Training Program
Management Support Activity (NETPMSA)
Pensacola, FL 32509

Academic Programs and Research Branch
Naval Technical Training Command
Code N-625
NAS Memphis (75)
Millington, TN 38054

Assistant for Training and
Personnel Technology
Office of the Under Secretary of
Defense for Research and Engineering
3D129, The Pentagon
Washington, DC 20301-3080

Director, Defense Personnel Security
Research and Education Center
Suite E, Building 455
99 Pacific Street
Monterey, CA 93940-2481

Personnel Analysis Division
AF/DPXA
5C360, The Pentagon
Washington, DC 20330

Technical Director
U.S. Army Research Institute for the
Behavioral and Social Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333-5600

Director, Manpower Program
Center for Naval Analyses
4401 Ford Avenue
P.O. Box 16268
Alexandria, VA 22302-0268

Technical Director
Air Force Human Resources Laboratory
Brooks Air Force Base, TX 78236-5601

Library
Naval Training Systems Center
Orlando, FL 32813

Library
Naval War College
Newport, RI 02940

Chief, Survey and Market
Analysis Division
Defense Manpower Data Center
1600 Wilson Boulevard, #400
Arlington, VA 22209

Program Director
Manpower Research & Advisory Services
Smithsonian Institution
801 North Pitt Street, Suite 120
Alexandria, VA 22314-1713

Dr. Meg Gerrard
Psychology Department
Iowa State University
Ames, Iowa 50011

Dr. Perry W. Thorndyke
FMC Central Engineering Labs
Box 580
Santa Clara, CA 95052

Dr. T. Govindaraj
School of Industrial & Systems Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0205

Prof. David W. Johnson
Cooperative Learning Center
University of Minnesota
150 Pillsbury Drive, S.E.
Minneapolis, MN 55455

Dr. Walter Schneider
Learning Research & Development Center
University of Pittsburgh
Pittsburgh, PA 15620

Prof. George A. Miller
Department of Psychology
Princeton University
Princeton, NJ 08544

Dr. Jeffery L. Kennington
School of Engineering & Applied Science
Southern Methodist University
Dallas, TX 75275-0335

Prof. Clark Glymour
Department of Philosophy
Carnegie-Mellon University
Pittsburgh, PA 15213

Prof. Kent E. Williams
Institute for Simulation & Training
University of Central Florida
P.O. Box 25000
Orlando, FL 32816-0544

Prof. Paul Feltovich
Southern Illinois University
School of Medicine
P.O. Box 3926
Springfield, IL 62708

Prof. Thomas G. Bever
Department of Psychology
The University of Rochester
River Station
Rochester, NY 14627

Dr. Lawrence J. Stricker
Educational Testing Service
Princeton, NJ 08541

Prof. Michael Levine
Dept. of Educational Psychology
University of Illinois
506 South Wright St.
Urbana, IL 61801

Prof. Patricia A. Carpenter
Psychology Department
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. William B. Johnson
Search Technology, Inc.
4725 Peachtree Corners Circle
Norcross, GA 30092